SHIN-NIPPON

REFRACTOR

MODEL: BR-7

SERVICE MANUAL

CONTENTS

1. Introduction ——— 3

1-1 Features of the Product ——— 3

1-2 Qualified Service Person ——— 4

1-3 How to Use the Service Manual ——— 4

1-4 Layout Plan of Optical Parts ——— 6

1-5 Name and Performance of Parts ——— 7

2. Service Items

Disassembly/Inspection/Adjustment Procedure ——— 8

3. Remarks

3-1 Adhesion, Kind of Oil and Application Point ——— 14

3-2 Service Tools ——— 18

1. Introduction

1-1 Features of the Product

We offer with confidence this optometer as a self-conscious optometer completed while incorporating necessary and sufficient functions on the basis of invaluable experiment of those who actually engage in optometry and our long experience in this field. This product will meet the demand of those who want correct and rapid optometry.

The beautiful appearance and comprehensive functions of the product will surely prove satisfactory:

(1) The cross cylinder and rotary prism, which are of a double loupe (turret) type, help keeping a constant distance from the eyes, ensuring precision measurement and easy use.

(2) A synchronous mechanism allows the cross cylinder loupe to move automatically while being interlocked with a cylindrical axis, ensuring highly effective precision measurement of the astigmatism.

(3) Easy operation through front observation and front operation

(4) Large power indicator window, enabling easy reading

(5) Wide-ranging inspections (binocular visual function

inspection, etc.) possible through combination of a visual acuity tester and abundant auxiliary lenses

(6) In a convergence mechanism for near distance inspection, the entire optical mechanism can be correctly set through lever operation.

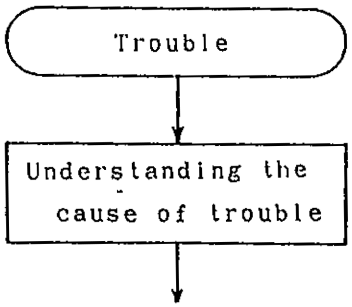
(7) Eyeshields and an optometry window are provided with a coated dust-proof glass which prevents light reflection and contamination of the lenses in the equipment.

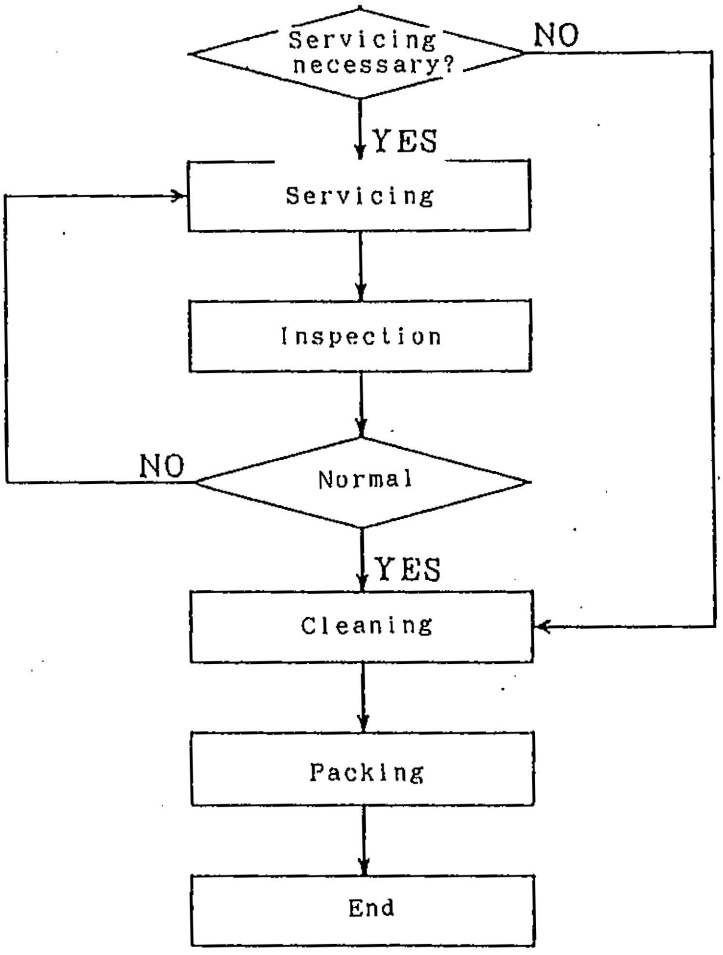
1-2 Qualified Service Person

Servicing of this product must be made by a person who is experienced in assembly and adjustment of the medical equipment (in particular, the reflector head). It is recommended for the others to attend the course on servicing technology of Towa Co., Ltd.

1-3 How to Use the Service Manual

(1) The service operation must be based on the flow chart shown below.





(2) Carry out disassembly, servicing, assembly and adjustment of the optical system in a clean place where there is no adverse effect on the product due to dust, etc.

(3) Always observe the manual thoroughly and use the specified materials and tools, ensuring correct and reliable servicing.

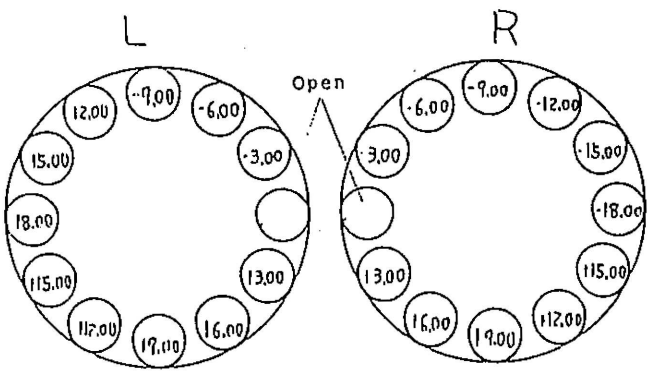
(4) Basically, replace the metal parts as individual pieces and the optical system components as a unit.

(5) For disassembly and assembly of parts not described in this manual, refer to the service parts list.

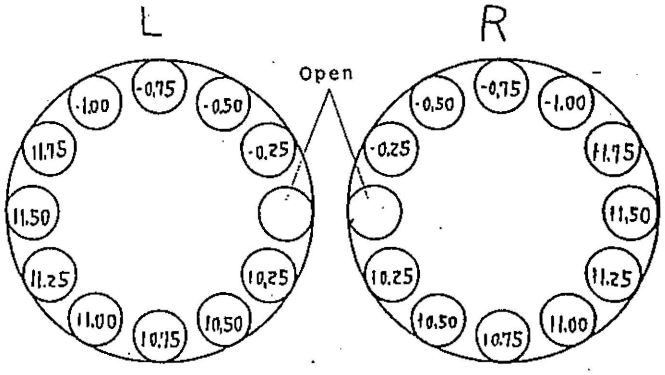
(6) Never use the lubricating oil other than the one specified.

(7) Order the service parts while referring to the service parts list.

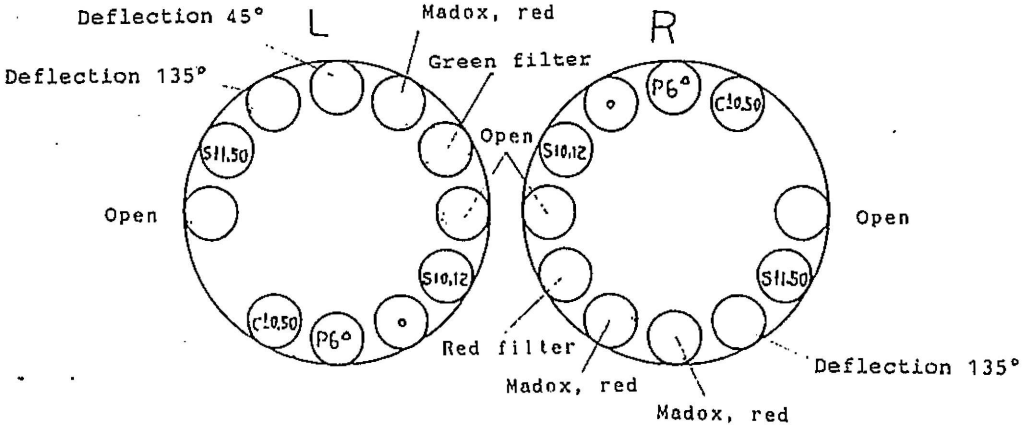
1-4 Layout Plan of Optical Parts



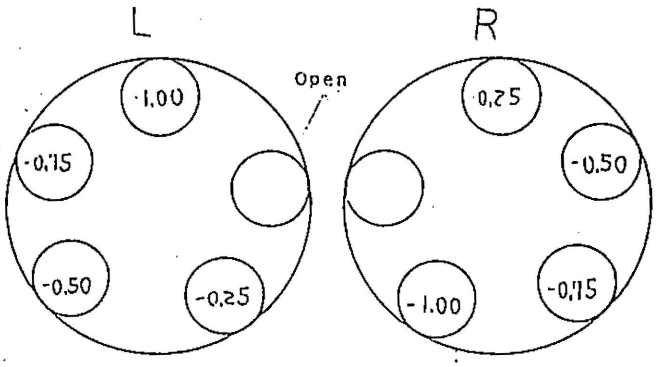
S1 (spherical disk)



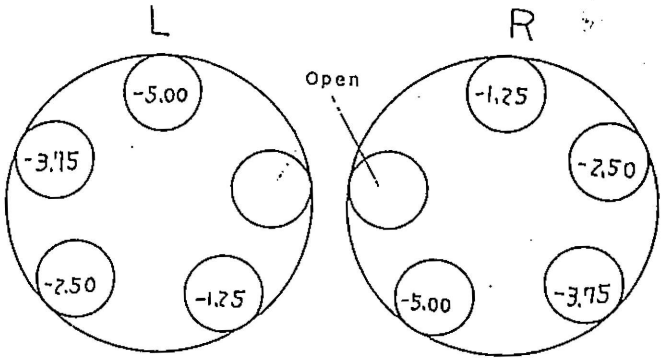
S2 (spherical disk)



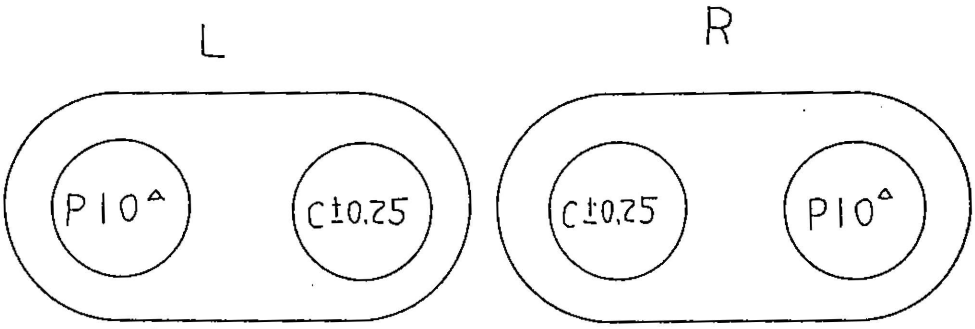
ACC (accessory)



C1 astigmatic disk

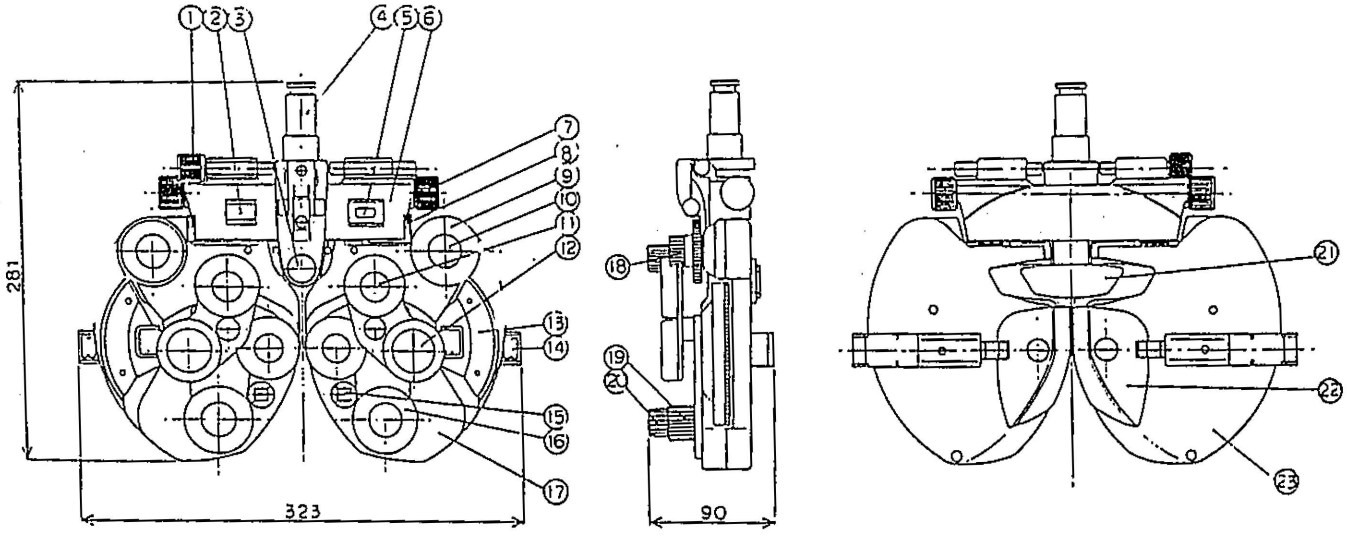


C2 astigmatic disk



Cross cylinder and rotary prism

1-5 Name and Performance of Parts



No.	Name	No.	Name
①	Level adjusting knob	⑫	Cross cylinder
②	PD scale	⑬	Loupe
③	Forehead rest adjusting knob	⑭	Cornea focus
④	Level shaft	⑮	Astigmatic scale plate
⑤	Level	⑯	Cylindrical axis scale plate
⑥	Head cover	⑰	Astigmatic case
⑦	PD adjusting knob	⑱	Power handle
⑧	Convergence knob	⑲	Cylindrical axis knob
⑨	Auxiliary lens scale plate	⑳	Astigmatic lens knob
⑩	Auxiliary lens knob	21	Forehead rest
⑪	Rotary prism	22	Cheek rest
		23	Spherical case

2. Service Items

① Adjustment of the lateral movement and play of PD

② Adjustment of the deviation and play of the astigmatic lens holder

③ Adjustment of the turret

④ Adjustment of the stopper roller of each disk plate

⑤ Adjustment of the cornea scale

⑥ Replacement of the cross cylinder

Disassembly/Inspection/Adjustment Procedure

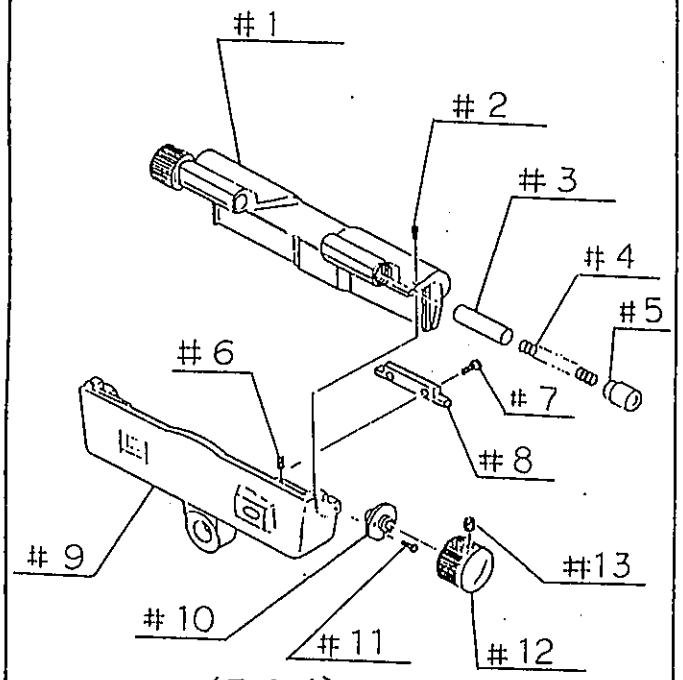
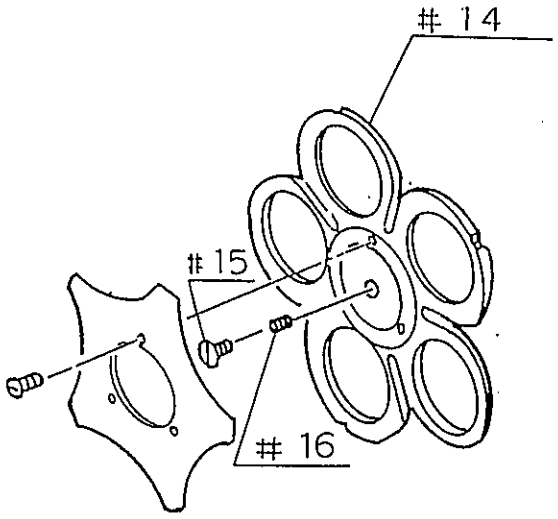
Illustration	Procedure
 (FIG. 1)	① Adjusting of the lateral movement and play of PD 1. Loosen to remove the spring case (#6) and remove spring guide (#3) and level coil (#4). 2. Loosen two screws 6R 3x8 (#2) and remove the head cover (#1). 3. Loosen to remove 6W 3x8 (#13) and remove the PD knob (#12). 4. Loosen to remove two screws 6S 3x8 (#11) and remove the PD bearing (#10). 5. Turn two to three times to loosen four screws 6S 3x8 (#7) on the guide plate (#8) and adjust the lateral movement and play of PD with four screws 6U 3x5 (#6) of the head (#9). (See Fig. 1)
 (FIG. 2)	② Adjusting the deviation and play of the astigmatic lens holder 1. Tighten or loosen the holder fixing screw (#15) and screw 6U 2.6x3 (#16) on the lens holder (#14) and adjust the deviation and play of the lens holder. (See Fig. 2)

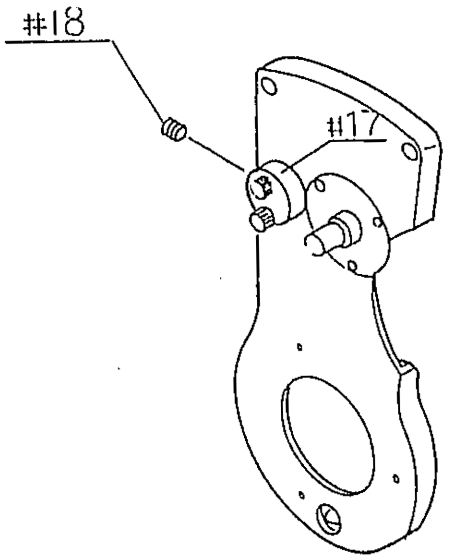
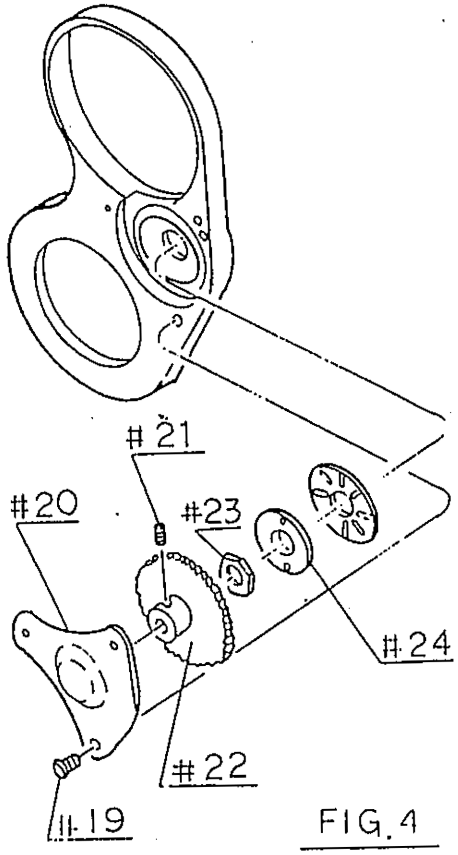
Illustration	Procedure
 FIG. 3	③ Adjusting the turret (1) Lateral adjustment 1. Adjust the lateral movement of the turret with a screw U 4x4 (#18) or the side of the click mount (#17). (See Fig. 3)
 FIG. 4	(2) Vertical adjustment 1. Loosen three screws CRs 2x3 (#19) and remove the cover (#20). 2. Loosen a screw 6U 2x3 (#21) and remove a center gear (#22). 3. Carry out vertical adjustment of the turret with a ring nut (#24) and hexagon nut (#23). (See Fig. 4)

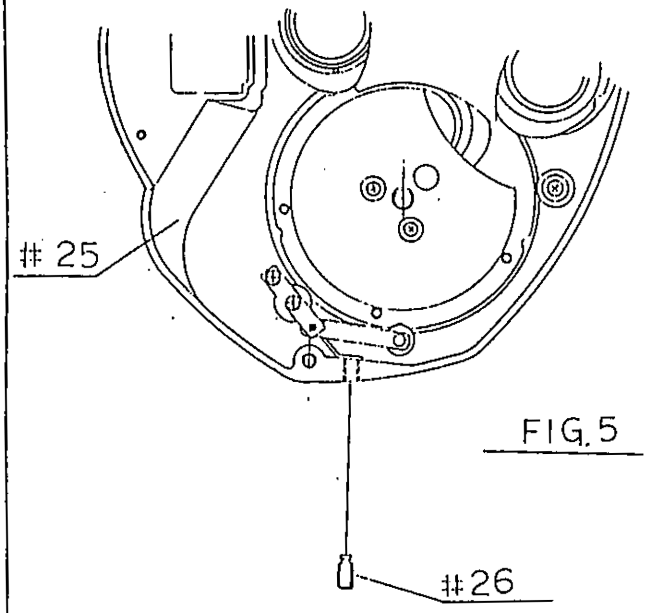
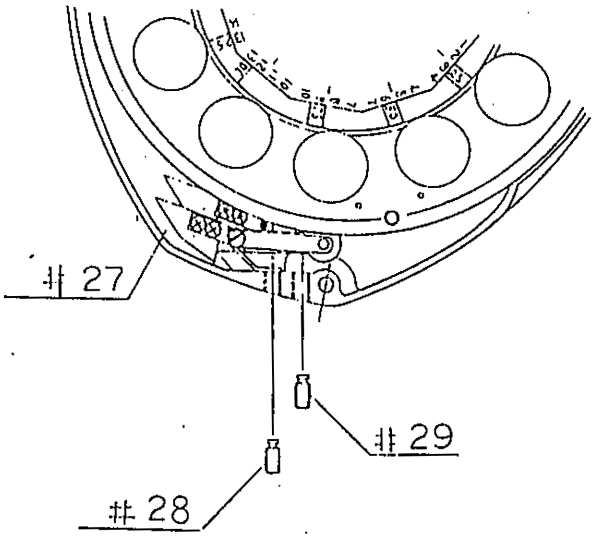
Illustration	Procedure
 FIG.5	(4) Adjustment of the stopper roller of each disk plate (1) Adjusting the astigmatic plate 1. Carry out adjustment of the astigmatic plate with a spring hook (#26) provided to the underside of the astigmatic case (#25). (See Fig. 5)
	(2) Adjusting the accessory plate 1. Carry out adjustment of the accessory plate with a spring hook (#29) provided to the underside of the spherical case (#27). (See Fig. 6)
 FIG.6	(3) Adjusting the spherical disk plate 1. Carry out adjustment of the disk plate with a spring hook (#28) provided to the underside of the spherical case (#27). (See Fig. 6)

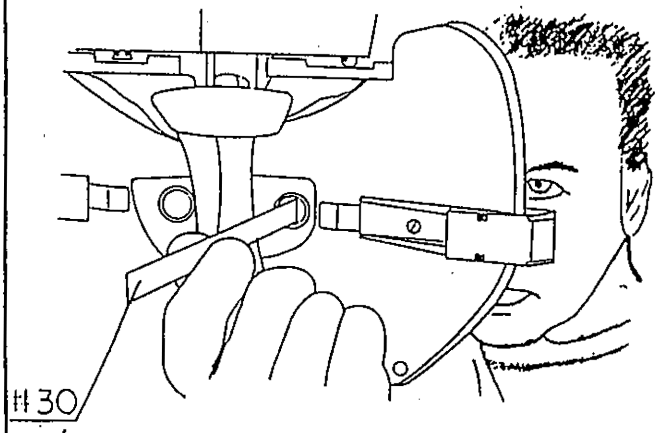
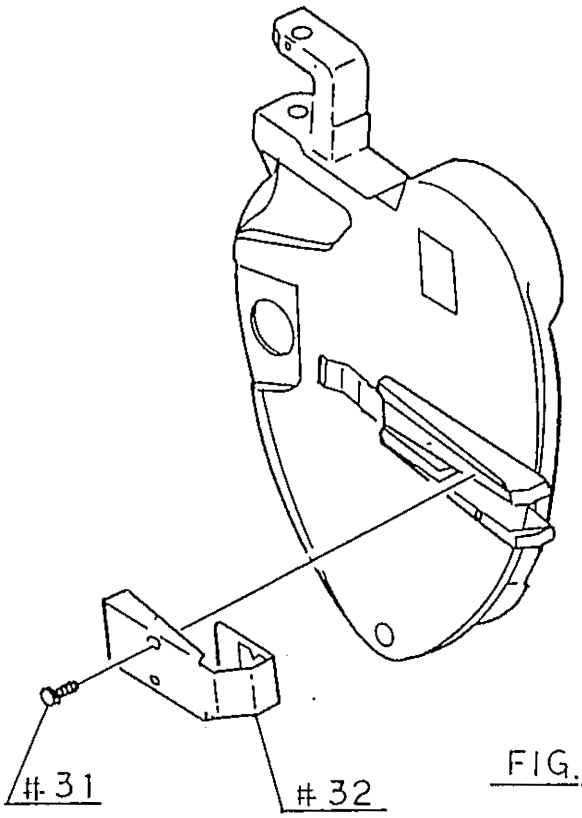
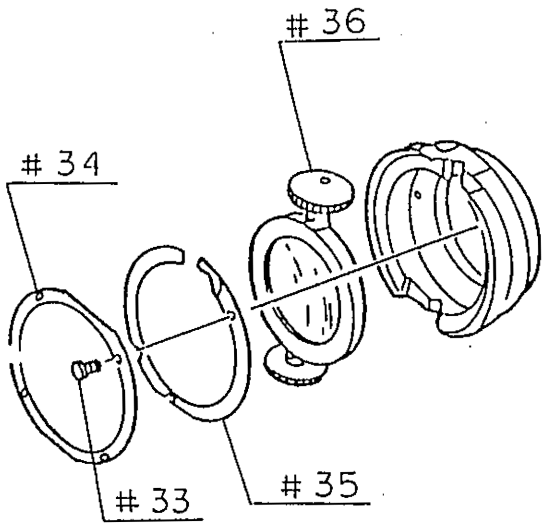
Illustration	Procedure
 FIG.7 図A  FIG.8	⑤ Adjusting the cornea scale 1. Set the power scale to -3.00. 2. Set a scale (#30) into a window through which a patient is to view. 3. Adjust so that the scale reading becomes 13.75 ~ 14.00 mm when the cornea focus appears as shown in Fig. A. 4. When the scale reading is not 13.75 ~ 14.00mm loosen two screws CRs 2x3 (#31) and move the cornea focus cover (#32) to right and left to adjust the cornea scale. (See Figs. 7 and 8)

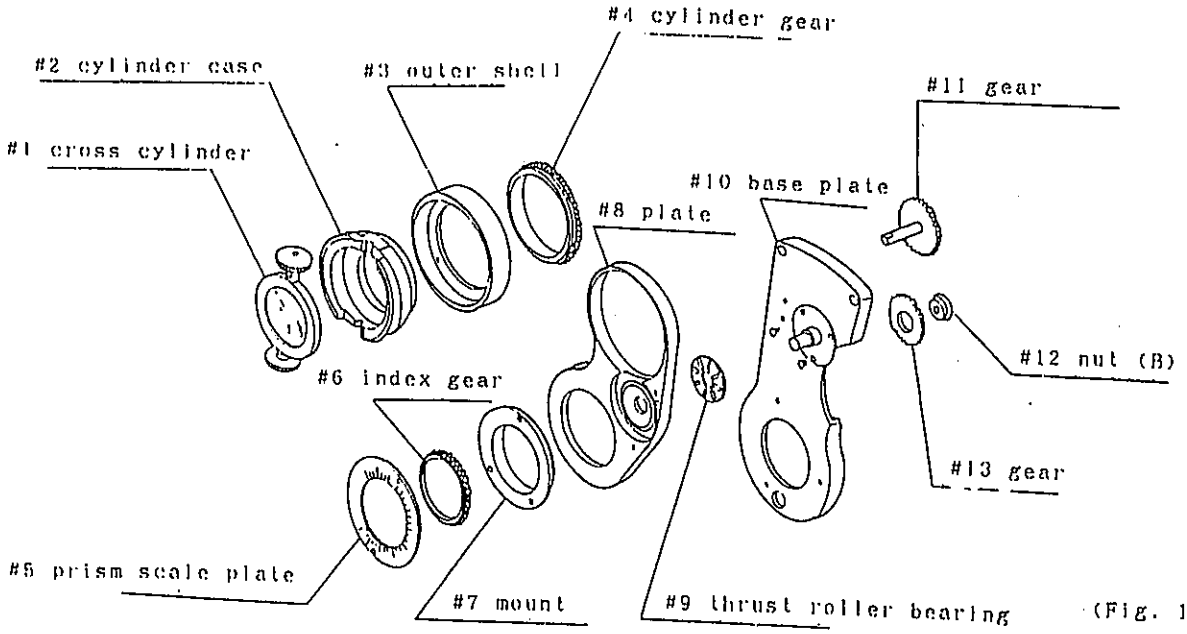
Illustration	Procedure
 FIG. 9	⑥ Replacing the cross cylinder 1. Loosen four screws CRs 2x3 (#23), and remove an indicator plate (#34) and spring (#35). Then, replace the cross cylinder (#36). (See Fig. 9) Note: Replacement of C+0.37 and C+0.50 is possible optionally.

Note: Replacement of C±0.37 and C±0.50 is possible optionally.

3. Remarks

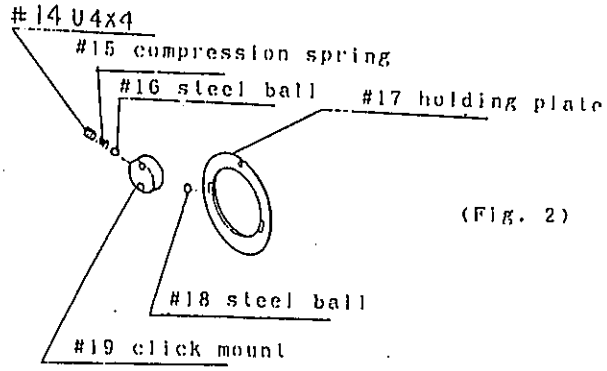
3-1 Adhesion, Kind of Oil and Application Point

(1) Turret



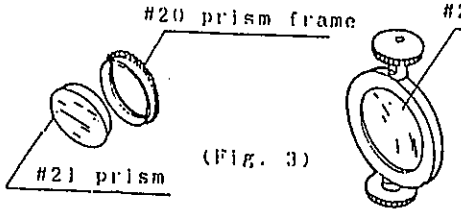
(Fig. 1)

1) Apply grease (EL-4) to parts #1 through #13. (See Fig. 1)



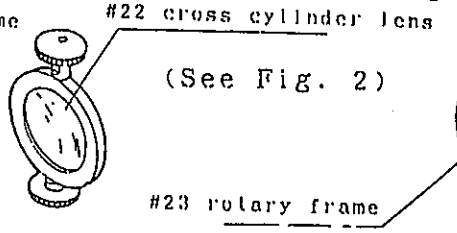
(Fig. 2)

2) Apply grease (X-1) to parts #14 through #19.

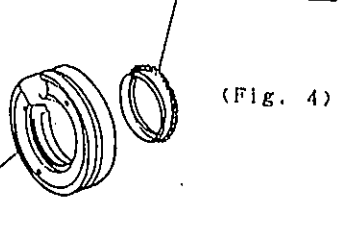


(Fig. 3)

3) Apply ultraviolet adhesive (photo-curing resin 3021) to #20 ~ #22. (See Fig. 3)



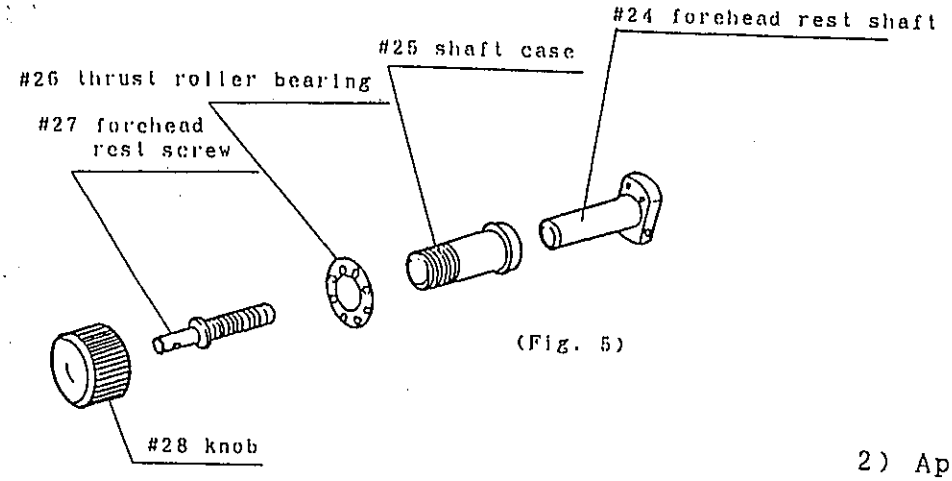
(See Fig. 2)



(Fig. 4)

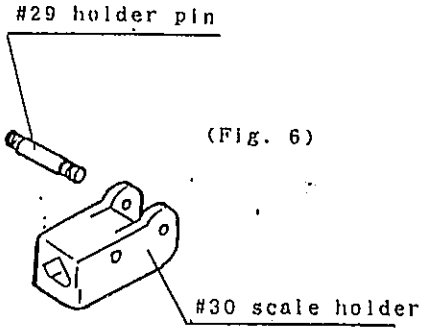
4) Apply Three-Bond (1901) to #20 and #23. (See Fig. 4)

② Head support



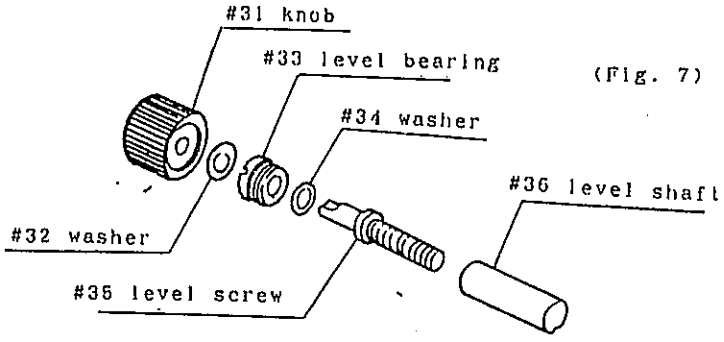
(Fig. 5)

1) Apply grease (001) to parts #24 through #28. (See Fig. 5)



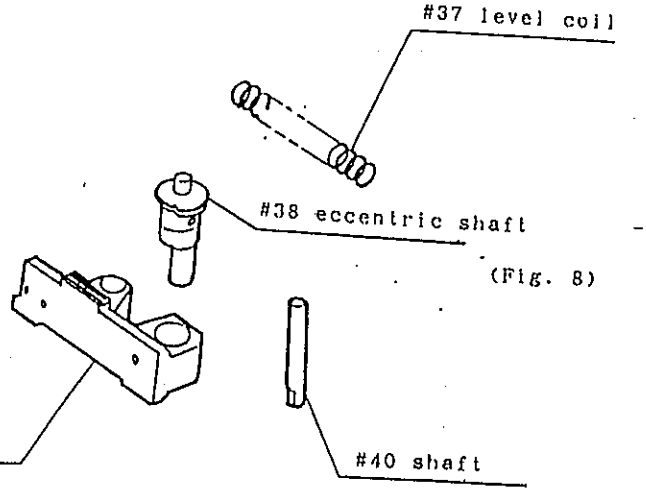
(Fig. 6)

2) Apply grease (X-1) to parts #29 and #30. (See Fig. 6)



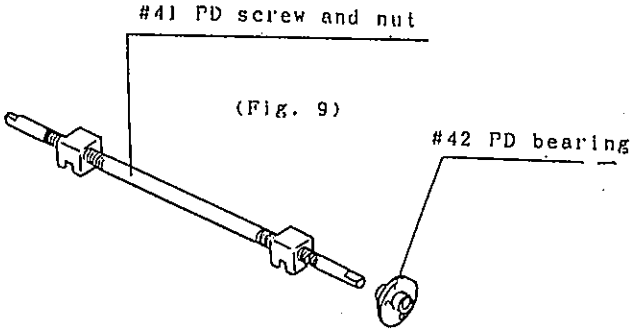
(Fig. 7)

3) Apply grease (001) to parts #31 through #36. (See Fig. 7)



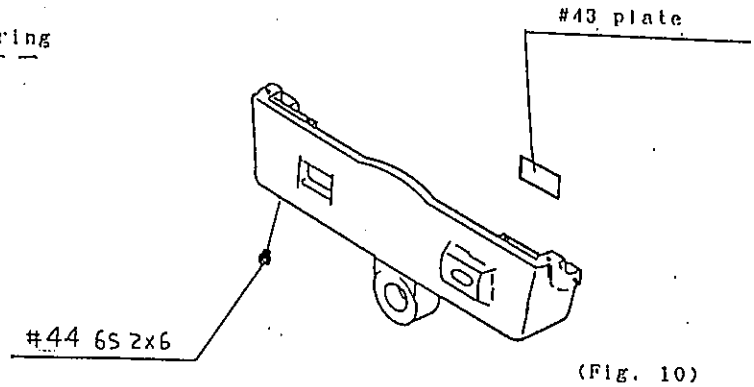
(Fig. 8)

4) Apply grease (X-1) to parts #37 through #40. (See Fig. 8)



(Fig. 9)

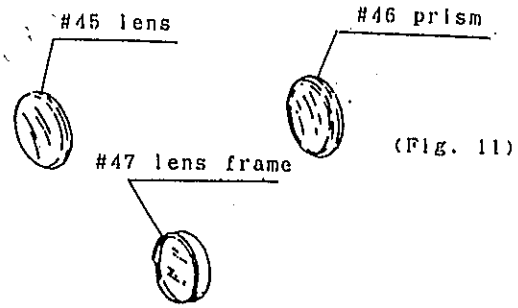
5) Apply grease (005) to parts #41 and #42. (See Fig. 9)



(Fig. 10)

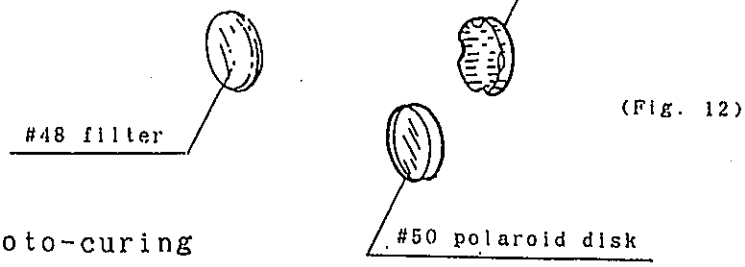
6) Apply silicon (liquid type RTV rubber of Shin-Etsu Silicon) to parts #43 and #44. (See Fig. 10)

③ Spherical case



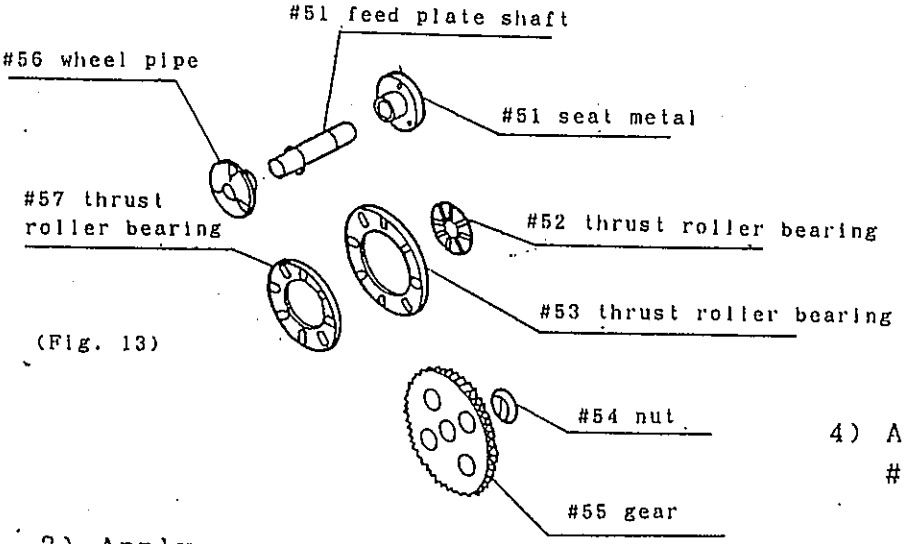
(Fig. 11)

1) Apply ultraviolet adhesive (photo-curing resin 3021) to parts #45 ~ #47. (See Fig. 11)



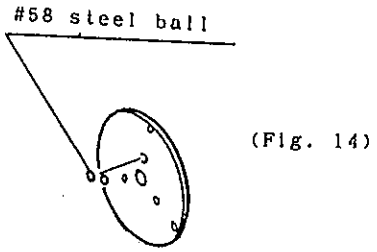
(Fig. 12)

2) Apply GS cement to parts #48 to #50. (See Fig. 12)



(Fig. 13)

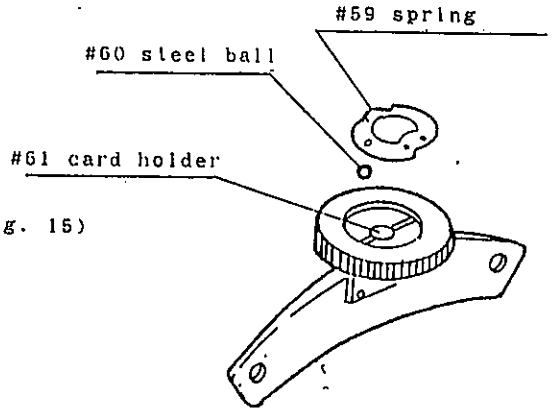
3) Apply grease (EL-4) to parts #51 through #57. (See Fig. 13)



(Fig. 14)

4) Apply grease (X-1) to the part #58. (See Fig. 14)

④ Near point scale

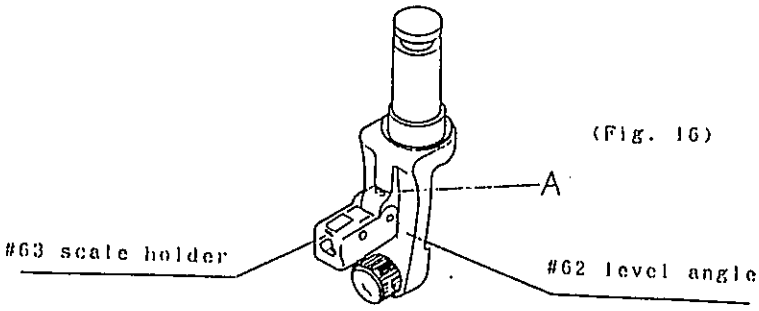


(Fig. 15)

1) Apply grease (X-1) to parts #59 to #61. (See Fig. 15)

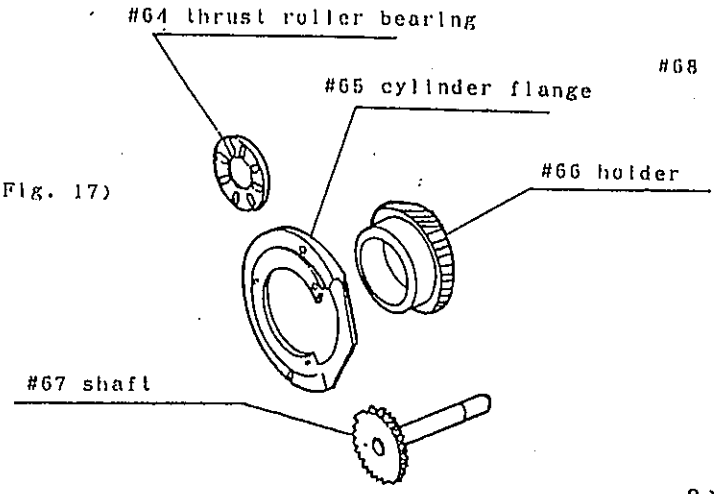
⑤ Near point scale holder

1) Fill a port A with machine oil. (See Fig. 16)



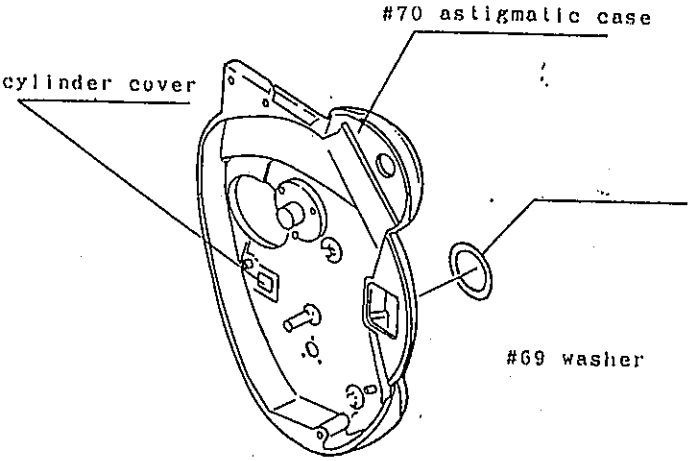
(Fig. 16)

⑥ Astigmatic case

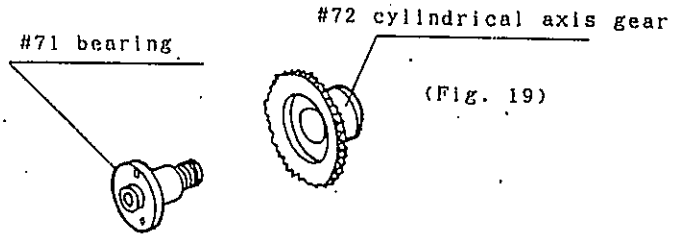


(Fig. 17)

1) Apply grease (EL-4) to parts #64 through #67. (See Fig. 17)

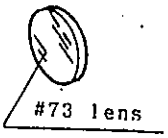


2) Apply ultraviolet adhesive (photo-curing resin 3021) to the part #68 and apply Three-Bond (1782) to parts #69 and #70. (See Fig. 18)



(Fig. 19)

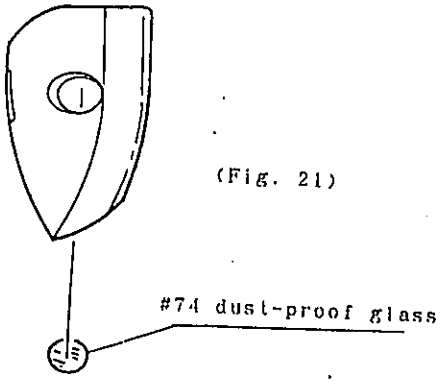
3) Apply grease (X-1) to parts #71 and #72. (See Fig. 19)



(Fig. 20)

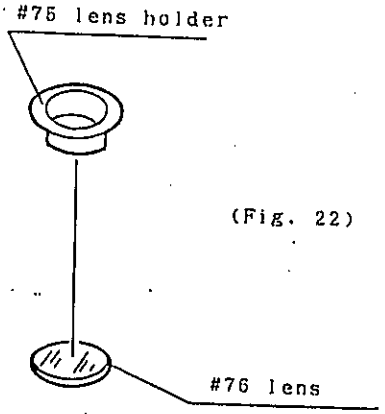
4) Apply GS cement to all of lenses (#73) in the lens holder. (See Fig. 20)

⑦ Accessories



(Fig. 21)

1) Apply Three-Bond (1782) to the part #74. (See Fig. 21)



(Fig. 22)

2) Apply ultrasonic adhesive (photo-curing resin 3021) to parts #75 and #76. (See Fig. 22)

3-2 Service Tools

1. Set screwdriver (standard and Philips screwdrivers #0).
2. Hexagonal wrenches (1.5, 2.0, 2.5 and 3.0 mm)
3. Radio pliers

No other dedicated tools than those specified above will not be necessary for the service work described in this manual.